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ABSTRACT

An intelligent videodisc system on which comprehensive instructional development research can be conducted has been developed. This integrated learning system combines all other existing media, except objects, using a videodisc, microcomputer, printer, single monitor, hard disc storage with CPU for random access digitized audio, and headphones. The system components can provide stills or motion with any variation of realism, two audio tracks, any computer-based instruction feature, hard copy, a high-resolution color display, and a touch screen. Future research can combine design attributes not possible or easily done before, including the combination of realism levels on one visual, complex cueing strategies, and realism combined with a touch screen. A systematic research approach to the identification of effective instructional design techniques is needed and is now possible by varying the videodisc system design features. Dwyer's heart materials would be useful in such research, because they incorporate different levels of objectives and visual abstraction to enhance instruction. Dwyer's model identifying the types of complexities associated with abstraction level in visuals, modified to account for visual learning processes, combined with the heart materials and the videodisc system would allow complex investigations. (LMM)

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A Symposium: Relevant Cue Research
A Program of Systematic Evaluation:

Considerations for Sustaining Instructional Design Research Using an Integrated Learning System

by

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The purpose of this presentation is to describe an integrated learning system on which comprehensive instructional development research can be conducted. This learning system in my opinion, will help to circumvent the more "dead" media research question which Richard Clark has called it, that compares delivery options and student achievement. The integrated learning system by its nature, focuses the researcher's attention on the more pertinent design questions that investigate which stimulus dimensions are effective in eliciting student achievement.

The integrated learning system is comprised of several equipment components: the videodisc, microcomputer, printer, single monitor, hard disc storage with CPU for random access digitized audio, and headphones.

The first statement may seem contradictory now since it appears I am presenting another media study, however, media selection is not the issue with this system. The learning system combines all other existing media (except real objects, of course, but which could be easily added), and therefore, represents an integrated audio and visual learning system. Deciding what is displayed on that one monitor, printed from the printer, or listened to through the headphones becomes attribute selection rather than media selection.

This system which will be operational at the Center for Instructional Development and Evaluation of the University of Maryland University College in the near future has also been called an intellegent videodisc learning system. A discussion of

the system features is warranted to understand why this learning system has the potential for becoming a powerful instructional development research tool.

From the videodisc, with its 54,000 slide or 30 minute motion capacity per side, stills or motion with any variation of realism (contained in any other medium) can be selected. Also, the videodisc itself has 2 audio tracks which can be used to present different verbal messages (if any) to complement the same visuals. The audio track, however, is limited to 30 minutes and takes up visual space, so we have added the hard disk that stores digitized audio in words or sound effects that can be randomly or systematically generated.

From the microcomputer, any feature provided by computer based instruction can be selected, that is, text, graphics, interaction through question and answers, branching, etc.

From the printer, hard copy versions of text, maps, assignments, etc. are available.

The monitor is the key component in this system because it has a high resolution color display, that enables intricate detailed color graphics. Most importantly, however for the research project, is that this one monitor can display the computer generated graphics, the visuals from the videodisc, or a combination of the two which overlays the computer graphics onto visuals. Another feature of the monitor is the touch sensitive screen, which simply means the system can be operated or questions answered by touching various portions of the screen

with your finger rather than searching and typing from the keyboard.

The hard disc computer stores all of the instructions for integrating the various system features.

Since this system is "integrated and intelligent," future research can combine various design attributes which were not possible or as easily done before. Of particular interest will be the potential for investigating the combination of levels of realism on one visual. What happens when a variety of realistic pictures are integrated in one lesson or one visual? The student views the realist photograph, then the line drawing is overlaid onto the realistic picture from computer graphics, the realistic picture disappears, leaving the line drawing and the instruction continues.

Next, the effects of more complex cueing strategies on learning could be investigated, such as the use of flashing arrows, or flashing areas of the picture themselves. Most interesting will be the integration of any of the capabilities of computer-based graphics with the realism and motion of other media.

Another variable which can be tested combines realism with the touch sensitive screen. Does the learner become more intimately involved with the instruction when he/she touches or traces the various parts of the visual, and is this the instructional variable needed for increasing learning and retention from realistic pictures, or even enhancing transfer? There is also great potential for assessing individual

differences by having on-line tests which branch students to different treatments.

As you can see with this very brief introduction, designing research or designing instruction using the intelligent videodisc learning system is a very complex process, and it also demonstrates the extent of the feature decisions instructional developers must make when preparing effective instruction.

After reading much of the literature describing design investigations which used variations of Dwyer's heart materials as their treatments, I realized that these materials would be most appropriate for research using the intelligent videodisc learning system. This is especially so primarily because the heart presentations were carefully developed to include different levels of objectives and different levels of abstraction in the visuals which would enhance the instruction. The presentations could be varied using most of the learning system features.

The next important reason for using his instructional materials is that the literature is full of calls for a systematic research approach to the identification of effective instructional design techniques. Many research investigations of the various effects of individual differences, cueing strategies, and presentational strategies on each level of objective and degree of realism in the visuals have already been conducted. Since these studies have already been conducted and the materials already been validated, a systematic investigation varying the design features available singly and in combination on the intelligent videodisc learning system is possible. (Such as

combining levels of realism in one visual--the computer generated line drawing overlaid onto the realistic picture, animated cueing, use of touch to touch or trace various parts of the visual, etc.)

Considering the tremendous potential for varying stimulus variables on this system to use it as a research tool, a systematic approach to conducting this comprehensive research would be needed. A logical approach has already been conceived in Dwyer's divisions into the four types of complexities associated with the various levels of abstraction in visuals. These are:

(1) different levels of objectives

(2) individual differences

(3) cueing differences

(4) differing presentational strategies

This structure would be useful by expanding item three, cueing differences, to include the visual learning/cognitive processes which Winn is proposing. He states "Cognitive theories of learning offer more comprehensive (though still imcomplete) accounts of learning that have profound implications for . . . building theories that direct practice" (Winn, 1982, p. 3). He presents three types of visual learning processes: perceptual, assimilative, and analogical processing. One of the instructional strategies matched to the assimilative process is cueing, so it seems these processes would fit well within the Dwyer model. Revising the model to account for visual learning processes increases the design questions which could be posed to

include a more comprehensive investigation of visual organization and design of instruction for integration into one's own schema. Because of the branching capabilities of the system many investigations in this area can be undertaken which may otherwise have been too complex to manage.

With these four areas as a structure, a careful breakdown of each into its components could then be built into theories which are tested with a selected combination of intelligent videodisc learning system features. From this analysis and theory building could come a comprehensive systematic plan for conducting ID research with the ultimate goal of directing instructional design with sound theory rather than intuition.

The intelligent videodisc learning system in the form presented is very expensive, so the likelihood that the combination of all of the components would be available in every school system is remote. However, I do believe that this system combined with Dwyer's heart materials and his breakdown of important areas for design investigation offers to researchers an ideal combination for attacking a very complex problem and responding to directives in the literature which call for "research to provide guidance for designers."

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